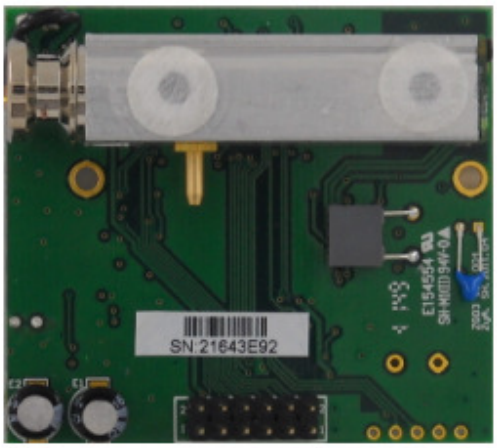
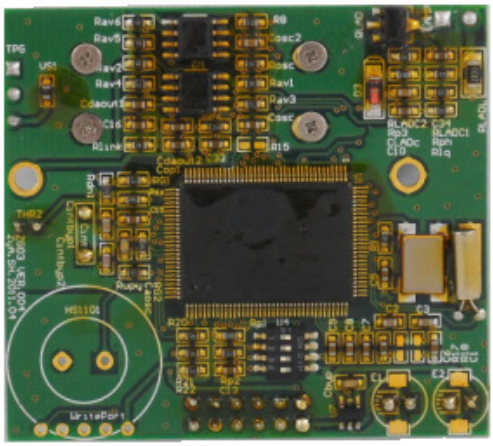
ZG03 CO2 Module User Manual

ZyAura





ZyAura, a world class leader and supplier of IR sensor technology and temperature measurement devices Small, Compact CO2 Module Designed to Integrate Into Existing Controls and Equipment. The ZG03 CO2 Module is designed to meet the volume, cost, and delivery expectations of HVAC. All units are factory calibrated.

Contents

Features **3**
Specification **3**
Pin Function **4**
Dip Switch Definition **4**
Output protocol **5**
UART **5**
DAC **7**
Dimension **7**
Module Type **8**

Features

- An affordable CO2 sensing solution for HVAC/DCV
- Dual Beam NDIR
- UART and DAC output
- CO2, Temp output (RH function ,optional)
- Diffusion or Flow Through type is selectable
- sNGC function（Auto Calibration function）

Specification

- Method: Dual Beam NDIR (Non Dispersive Infrared)
- Sampling method: Diffusion or Pumped Flow (50~200ml/min)

■Performance - CO2

Measurement Range	0-3,000 ppm display (2000ppm, 5000ppm, 10,000ppm are optional)
Accuracy	±70 ppm or ±5% of reading
Repeatability	±20 ppm
Temperature Dependence	Typ.±0.2% of reading per °C or ±2 ppm per °C, whichever is greater, referenced to 25°C
Pressure Dependence	0.13% of reading per mm Hg (Corrected via user input for altitude)
Response Time	About 40sec for 90% of step change
Warm-Up Time	<60 seconds

■ Performance - Temperature

Temperature Range	32 to 122°F (0 to 50°C)
Accuracy	±2°F (±1°C) When the fan blows to the device directly, the accuracy of temperature is + / -1.5 °C.
Response Time	20-30 minutes (case must equilibrate with environment)

■ Performance – RH (Optional, default is null)

Measurement Range	20%-90% RH
Accuracy:	±5%RH@23°C
Response time:	About 5 min for 63% of step change

■ Operating Conditions

Operating conditions	32°F to 122°F (0°C to 50°C) 0 to 95% RH, non condensing
Storage conditions	-4°F to 140°F (-20°C to 60°C)

■Power Supply and Output

Power Supply	5VDC supply (+/-5%),Ripple and Noise (mVp-p) 200
Power Consumption	Max.200mA, average :20mA
Analogue Output	0~4VDC (Temperature/RH ,CO2 are independent channel, RH and Temp. are the same channel , optional by Jumper)
Storage conditions	-4°F to 140°F (-20°C to 60°C)
Digital Output	UART(Baud Rate: 19200, Check Bit : None ,Data Bit: 8 bit, Stop Bit:1)
	SPIr output (Special output)

Pin Function

1 5 VDC (input power)
2 GND
3 AVOUT (Temperature or RH, depends the Jumper, default is temperature)
4 AVOUT (CO2)
5 Data of SPIr
6 No connect
7 No connect
8 No connect
9 Clock of SPIr
10 TDX (UART)
11 RDX (UART)
12 GND

Dip Switch Definition

	1	2	3	4
On	Na	UART	sGNC Disable	RH
Off	Na	SPIr	sGNC Enable	Temp

Table.1

1. NA
2. sNGC if the third code switch is 'ON', RH, if the third code switch is 'OFF', Temp.
3. Temp/RH: DAC output: when the code switch is 'ON', RH, when the code switch is 'OFF', Temp
4. NA

Note of sNGC: After changing status of sNGC, the machine should be restarted, otherwise the outcome of CO2 will be influenced considerably.

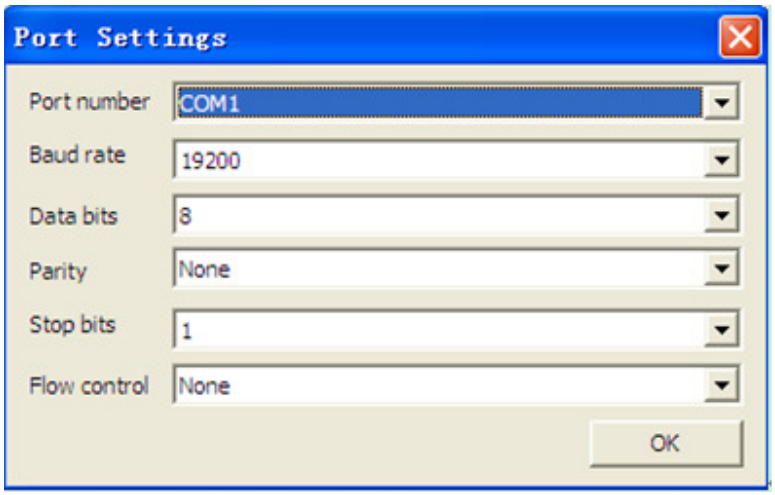
Function enable of sNGC: Please dial the second code switch to'ON' and open the sNGC Function, otherwise the sNGC Function will close.

Output protocol

UART (This protocol is default)

The digital output is standard UART; its baud rate is 19200, check bit: none. Data bit: 8 bit, stop bit: 1.
CO2 ItemCode is <P>, and Temperature ItemCode is <B>

Notes: The UART of this sensor is compatible with 3.3Vdc CMOS level specification. ZG03 need a "External UART to RS232 transmitter" to connect PC.



There are 2kinds output mode, one is Master Mode; the other is Slave Mode.

Under Slave Mode:
User need send the command, to get the CO2 and temperature reading.

Read CO2 concentration: Read the gas ppm as measured by the sensor. Response is a2-byte Decimal value giving the ppm.
Send: 23 31 30 0D
Possible
Reply: #1578 (for PPM =1578ppm)

Read Temp: Read the Ambient temperature degC as measured by the sensor. Response is a2-byte Decimal value giving the degC.
Send: 23 31 31 0D
Possible
Reply: #2266 (for Ambient temperature =22.66degC)
Notes: The sample may be output degC or degF. Above sample is degC.

Under Master Mode: (that's the default setting)
The device will send out the CO2 concentration and temperature continuously.

The format of message is: Item MSB LSB Sum CR

Item	"B" (42h): Tobj (Temperature of Obj)
MSB	8 bit Data Msb
LSB	8 bit Data Lsb
Sum	Item+MSB+LSB=SUM
CR	0Dh, end of the message

For example:
The CO2 ItemCode is "P", If received message: 02 50 30 33 32 30 37 33 0D, that means P0320, CO2 concentration is Hex2Dec (0320) = 800ppm
The Temperature ItemCode is "B",If received message: 02 42 31 32 38 30 44 34 0D, that means B1280, Temperature is Hex2dec (1280)/16-273.15 = 22.85degC
The RH (optional) ItemCode is "A". if received message: 02 41 31 31 44 35 32 37 0D, that means A11D5, the actual RH is Hex2Dec(11D5)/10000= 46%

Notes: The No.2 of Dip Switch must be "ON". Otherwise the output protocol will be SPIr.

Timing of SPIr is below (This protocol is for factory calibration)

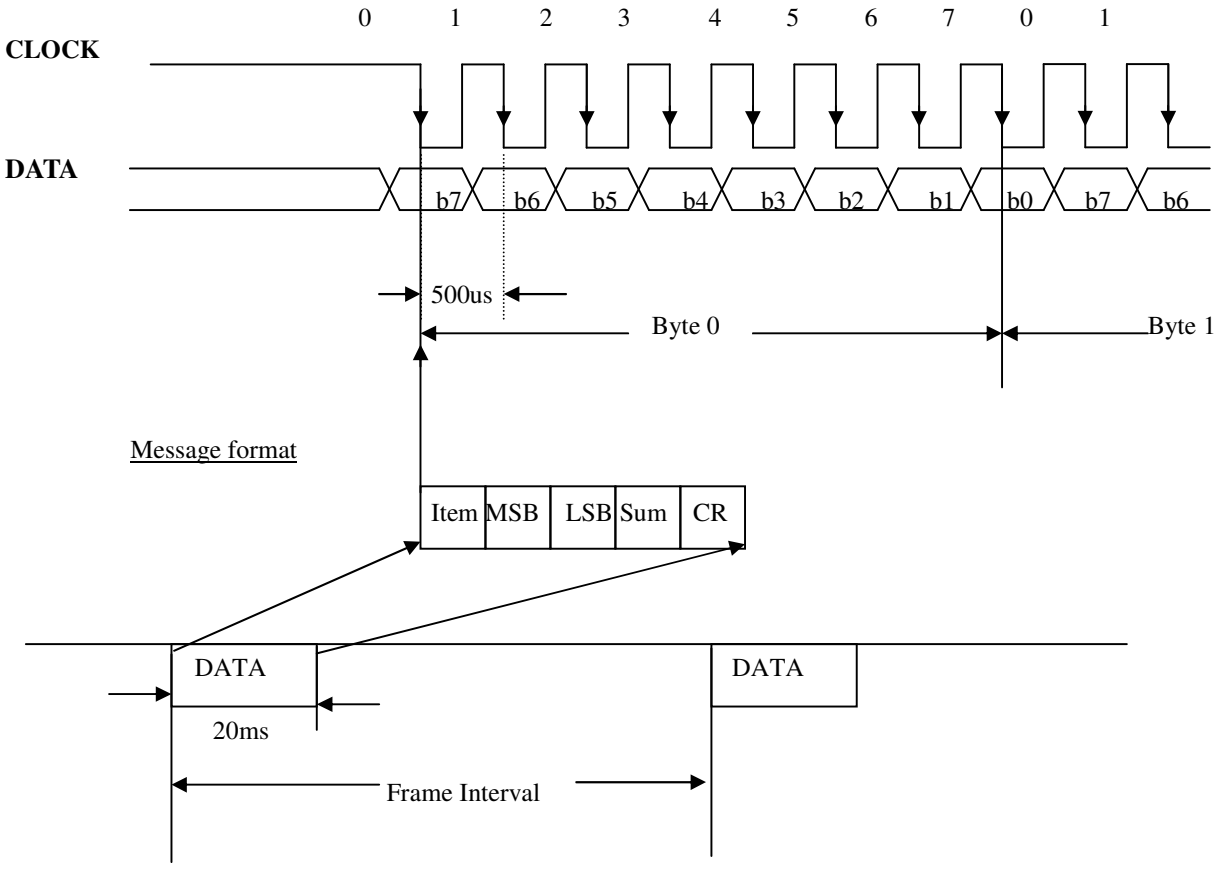


Fig1. Timing of SPI

SPIr Timing voltage specification:

SPIr is compatible with 3.3Vdc CMOS， Data, Clock，
Reset Pin ViH=2.0Vdc, ViL=0.8Vdc, VoH=2.4Vdc, VO = 0.8V

DAC

The analogue output of CO2 and temperature (or RH) is linear.
For example:
Aout (CO2) Output is 1.6V, that means CO2 concentration is 1.6(v)/4(v)*3000(ppm) = 1200ppm
Aout (Temp) Output is 2.0V, that means temperature is 2.0(v)/4(v)*50degC= 25.0degC

Dimension

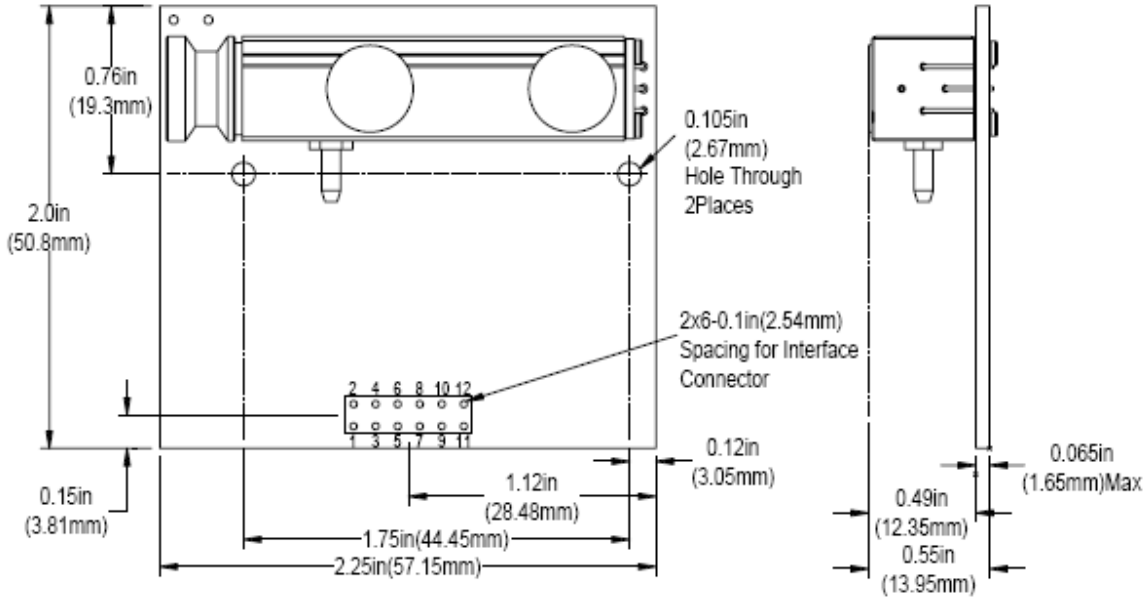


Fig2. Board layout and component

Module Type

- **ZG03-D (Diffusion, this is the default type)**

Air can be introduced to the sensor via the flow port and exit through the diffusion membrane (typical configuration for calibration). Flow rate of ~100cc/Min required.

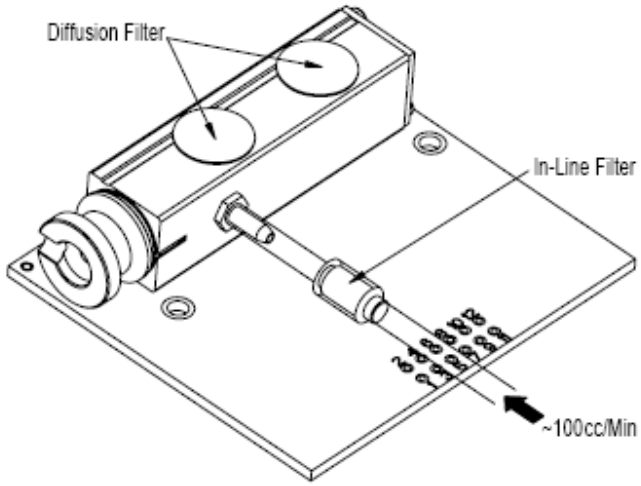


Fig.3 (Diffusion Filter)

- **ZG03-F(Flow Through Type，this is the optional type)**

The diffusion membrane is replaced with a non permeable seal. The two flow ports can be used for flow through sampling. Flow rate of ~100cc/Min required.

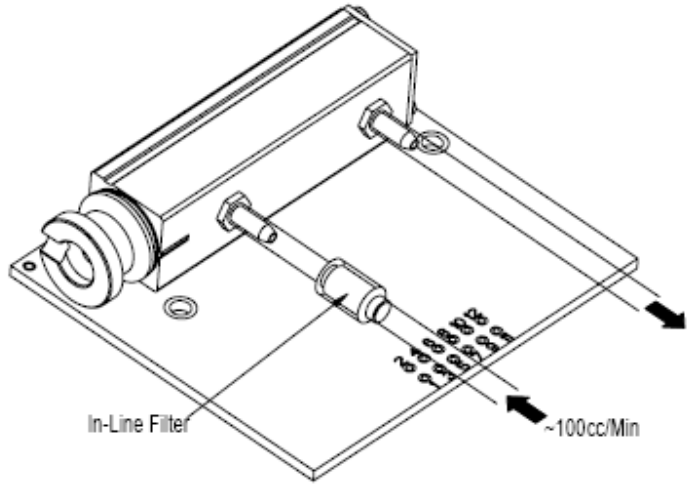


Fig4. Flow Through

Note:

1）Before using this module, the In-Line Filter must be fixed on the Air cell（In-Line Filter is not the accessories of the standards , ZyAura will not offer）,otherwise the dust will cause the deviation.

2）While power on，the positive and negative pole must be connected right，otherwise the sensor will burn out.

Warning：This ver. User manual is the temporary one; please refer to the www.ZyAura.com for updated version.